THE GLASS INDUSTRY

VOLUME 26, NUMBER 10, OCTOBER, 1945

QUALITY CONTROL TECHNIQUES APPLICABLE TO GLASS TANK OPERATION

By FRANK W. PRESTON

In THE GLASS INDUSTRY for November, 1943, p. 474, reference was made to an article in *Fortune*, which called attention to the use of that branch of mathematical statistics called Quality Control, though a better name would be Process Control. We there announced that the Testing Procedure Committee of the G. C. A., and various members thereof in their own plants, had for some time been testing out the applicability of the method to glass plant operation, and would probably have some concrete proposals to offer in due course.

It had become apparent at that time, that for the most important things that needed control (from the point of view of the Committee) we lacked proper means for measuring some property that could serve as a basis for control. For instance, one of the most important things was the homogeneity of the glass, and there was no satisfactory method for measuring this quantitatively with any accuracy.

About this time, however, it was discovered that there is usually a very definite correlation between the degree of homogeneity on Wednesday and the day-to-day variations of the density of the glass in the 3-day period, Monday to Wednesday. It is not known at present whether this is true for flat glass tanks, but it was found to be somewhat generally true for bottleglass furnaces, with which alone the G. C. A. was concerned.

This made it possible, for control purposes proper, to abandon the rather complex centrifuge technique devised by Dr. J. C. Turnbull some years earlier, and to measure simply the variation of density, from day to day, of substantial lumps of glass cut from the shoulder of a commercially annealed bottle.

This day-to-day variation can be measured with about ten times the precision of an ordinary chemical analysis, and in a matter of minutes, whereas chemical analysis takes many hours. It turns out, in fact, that it can be measured with enough accuracy to permit "Quality Control" to be used by its means. This is not true of chemical analysis, where apparent variations are very likely to be in the analysis and not in the tank.

The Committee then proceeded to determine the best way to measure density, and the possible sources of error (such as differences in the annealing schedule, which affect density somewhat). Finally one firm submitted a great many "blind" samples to the Preston Laboratories to check the over-all accuracy of the method.

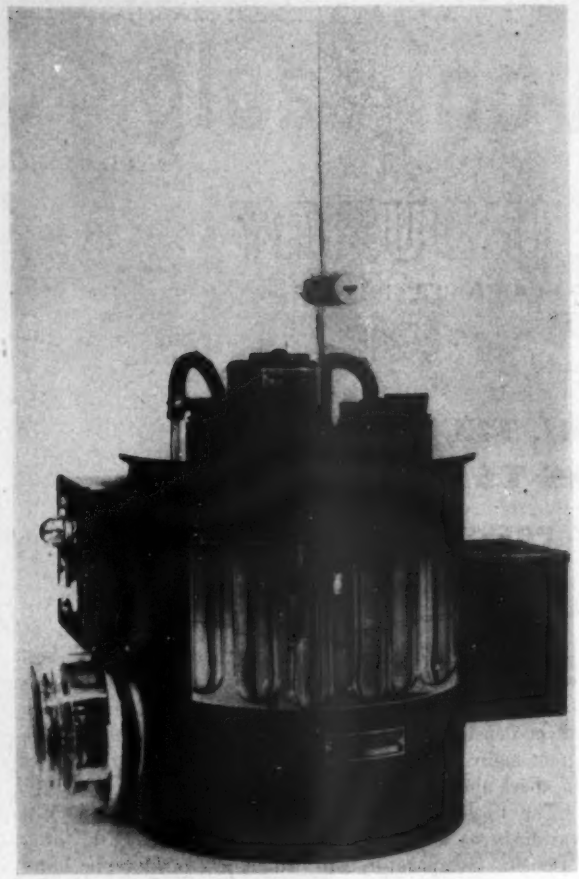
The upshot is a new measuring contrivance known variously as a "Sink-Float Bath," "Settling Bath" or a "Density Comparator," in which a considerable number of samples, from as many different tanks, can be tested simultaneously. Since each sample is compared with its own standard, the method is essentially a "differential" one; and since the homogeneity of the glass depends on these differences or differentials, and not on any absolute values of density, it is precisely what is required for this particular purpose.

The apparatus is definitely intended for Process Control, and is to be used with the usual paraphernalia in the way of charts, kept up from day to day, with which "Quality" Control invariably operates.

The apparatus, and the method, are now in use in many plants in this country and some in Canada. It seems likely to meet with very general acceptance.

Thus the promise of November 1943 appears adequately to have been redeemed.

The apparatus itself is described by Knight in a paper presumably to be published in the *J. Amer. Ceram. Soc. 28* (November 1945) "Glass Densities by Settling Method," and the quality control technique by Ghering in the *J. Amer. Ceram. Soc. 27* (12) 373-387 (1944) "Refined Method of Control of Cordiness and Workability of Glass During Production, Statistical Control Charts Applied to Daily Measurements of Density." Some further data on related points may be found in THE GLASS INDUSTRY, April 1945, by Knight "Calculation of Density and Specific Gravity Data for Container Glasses: Corrections for Temperature and Air Buoyancy," and in the *J. Amer. Ceram. Soc. 27* 260-66 (September 1944) by Ghering and Knight, "Properties and Diagnosis of Cords in Pressed and Blown Glassware."



"Sink-Float" Density Comparator

It now becomes possible to venture a few further predictions and promises.

(1) Chemical analysis will not be superseded for all purposes, but it will definitely be superseded as a means of routine Factory Control, unless some quite unlikely development greatly increases its accuracy. When something extraordinary is known to have gone wrong, chemical analysis may be useful in deciding what it is. The centrifuge technique for separating fractions of different densities may be found a useful procedure also, either alone, or followed by analysis of the fractions.

(2) Raw materials will come under closer scrutiny. The time heretofore used in analysis of the Product—the finished glass—will in part at least be diverted to determining the constancy of the Raw materials.

(3) Raw materials like burnt lime, which pick up varying amounts of water and carbon dioxide from the air, are likely to be abandoned in favor of raw limestone, which is more nearly constant in this respect. Raw materials like sand, which in some cases arrive at the plant with variable water content, will be watched closely. It may be found convenient to ship them moist, in open cars perhaps, and to dry them thoroughly on arrival, before storing them in the bins. Some flat-glass manufacturers adopt this method, but simply for reasons of economy, and not so much for quality control.

(4) The success of differential density measurements in this field will spur a search for other physical properties that may be used equally well for the same purpose. In one of the U. S. Government laboratories there is a school of thought which contends that optical density (refractive index) ought to be better than mechanical density. This is not impossible, but the point is as yet unproved. There is nothing to be gained by measuring *both* sorts of density (as the same school appears to believe) since the two run so nearly parallel.

On the other hand there are other physical properties which can be measured with some precision—certainly much more accurately than a chemical analysis, and perhaps as accurately as density. Further, these physical properties do not necessarily, or usually, parallel mechanical density, and therefore give additional information as to probable causes of variation.

* * *

Statistical Control Techniques can be applied to bottles in the field of mere geometrical dimensions (height, diameter, capacity), which is the field most often used in mechanical engineering plants. They are also being applied, in a preliminary fashion, to a few other quality characteristics. In some cases the application is working out very simply and satisfactorily.

It seems probable to the writer, however, that the more interesting (and perhaps more important) applications will await the development of new techniques of instrumentation. The glasshouse is gradually becoming a more scientific place, and such developments must certainly be expected.

INAUGURAL MEETING OF NEW YORK ACS ANNOUNCED

The inaugural meeting of the New York Metropolitan Section of the American Ceramic Society will be held Wednesday evening, October 17, at the Building Trades Employers Association in New York City.

It has been announced that C. Forrest Tefft, President of A.C.S., will attend the meeting and present the charter. Charles S. Pearce, Associate Secretary, is also expected to be present.

The business of the evening will include the election of officers for the coming year, and a talk by Jan S. Irvine, Eastern manager of Owens-Corning Fiberglas Corporation, is scheduled. The subject of Mr. Irvine's talk will be "Fiberglas and Its Applications, War and Postwar."

Chairman of the organizational committee for the new section is Joseph A. Pask, Lamp Division, Westinghouse Electric Corporation. Other members serving on the committee are James B. Austin, James F. Barns, J. C. Crawford, Robert M. Curts, Cyril B. Delgado, Emerson W. Emrich, Frank J. Fallon, Perry C. McCollom, Rexford Newcomb, Jr., R. H. H. Pierce, Jr., Elmer Rosenberg, R. F. Sherwood, J. D. Tetrick, and C. C. Treischel.

THE FOREMAN'S PART IN VETERAN REHIRING

by LAWRENCE STESSIN
Vice-President, Labor Relations Institute

Reemployment of veterans is becoming less and less a top management problem, and more and more a responsibility for foremen. When the broad outlines of management and personnel policy have been drawn, the hardest task still lies ahead—achieving an orderly absorption of returning veterans into the company ranks.

The veteran's right to return to his former job, or to a position of equal seniority, status and pay, providing that he was the permanent holder of the job, and not a replacement, has been established in the courts. The first test case of "super-seniority"—the right of the rehired veteran to displace workers of greater seniority—has also been decided in the veteran's favor. There still are many bothersome wrinkles to iron out, but it seems safe to predict that the spirit and the letter of the G.I. Bill of Rights and the Selective Service Act will be respected throughout industry.

This is the point where policy ends and practice begins. The decision has been made to rehire every veteran legally entitled to reinstatement, plus, perhaps, every possible replacement who subsequently entered the armed forces. But *who* is going to see that the job is open when the vet returns? *Who* is going to attend to the details of reinduction and reorientation? *Who* will assume the burden of making the returnee feel at home? If there is to be retraining for the old job, or preparation for a new and better one, *who* will make the decision and execute the follow-through? And *who*, day after day and year after year, will represent the Company in man-to-man dealings with the boys who came back?

There are more questions, but only one answer—*the foreman*. He is the determining factor in the success or failure of the reinstatement program. The supervisor has it in his power to fulfill the employer's promises, upon which the former soldier or seaman has banked for the duration, or to sour the entire program through lack of cooperation and consideration. For instance, here are some of the major duties which supervisors must perform, in order to make the reinstatement program a success: 1. Classify returning employees according to regular or replacement status. 2. Determine the first group's seniority, status and pay. 3. Plan ahead for the veteran's return, so that he can be reinstated without delay. 4. Smooth out all concurrent problems, such as the displacement of civilian workers to make room for the veterans who are to take over the jobs. 5. Reinduct the veterans and give them a "fresh start" toward success on the job—and eventual promotion. 6. Help them through the difficult readjustment from military to civilian life.

It will pay to look more closely at each of these important points. Let us take them up in the order given.

1. *Classifying returning veterans:* Every person who left the firm's employ to enter the service, belongs in either the "regular" or "replacement" class. What amounts to an inventory must be taken to see how many persons there are in each group. Some of this information can be secured from the personnel department records, but it is sound practice to have each record examined by the proper foreman as a check upon its accuracy. An error in determining the status of the veteran could result in litigation. Even "replacements" who have been correctly classified may appeal to Selective Service or the courts, so it is important to have an accurate record.

2. *Determining status, seniority and pay:* The simplest way to do this is to set up a 5 x 7 card for each employee who joined the armed forces, filling in the name and other available data at the personnel office and then distributing them to the proper supervisors to be completed. Each card should provide space for such specifications as job number, rate, seniority, date of leaving for military service, probable placement after return, plus information as to what must happen to the present worker on that job. Can the latter be used elsewhere in the department? Does he or she have skills which might justify a transfer? Is it desirable to retain this worker in addition to rehiring the veteran who has a claim upon the job?

3. *Planning ahead for veterans' return:* In each department, the foreman should make up an organization list or chart which assigns a specific job to each potential returned veteran who has been classified as the "regular" holder of a job. It need not be the exact position he occupied before he was inducted, but it must be every bit as good—or better. This chart, of course, will have to be brought up to date as servicemen announce whether or not they plan to return. In the absence of word to the contrary, it is wise to assume that all veterans will come back, and that they are physically able to resume their former occupations.

In the case of the handicapped, supervisors can be of tremendous help in selecting or revising jobs which can be performed by such veterans. However much special counsel management secured in this direction, there is no substitute for the practical experience and enthusiastic support of the foreman on the job. He knows every wrinkle, every possible deviation from established routine. He should be sold on making extraordinary efforts to help out the amputee and the vet whose health has been undermined by the war.

4. *Displacing civilian workers:* If the present employees fully realize that their jobs are temporary, and are subject to claim by returned veterans, there can be no serious ground for resentment when the issue finally arises. If seniority is the only basis for decision, as it is in some plants, every worker's seniority status should be clearly understood. If there is to be any question on such grounds, it is better to "have it out" via the regular grievance machinery *before* the veteran returns.

Supervisors should be placed on their guard against

(*Continued on page* 486)

Fig. 1.

THE ABBOTT ARMY MEDICINE COLLECTION OF PAINTINGS

Fig. 3.

Fig. 2.

Fig. 1. Three operations are shown in the manufacture of clinical thermometers. Workmen at the left combine three different types of glass in the hot viscous state; in the center they are being welded and, at the right, the gobs are being drawn perpendicularly into the thin rod of thermometer tubing.

Fig. 2. The most powerful objective lens is no bigger than the head of a large pin. Literally, no tolerances are allowed—accuracy must be absolute, hence the grinding of the lens and setting in the housings, shown at the right, is a painstaking operation.

Abbott Laboratories, internationally famous manufacturers of pharmaceuticals, has acquired a series of paintings depicting the manufacture of various types of glass used in the field of medicine. These paintings were executed by the noted American artist, Ernest Fiene. Other examples of his work done at Corning Glass Works were reproduced in the February 1945 issue of THE GLASS INDUSTRY.

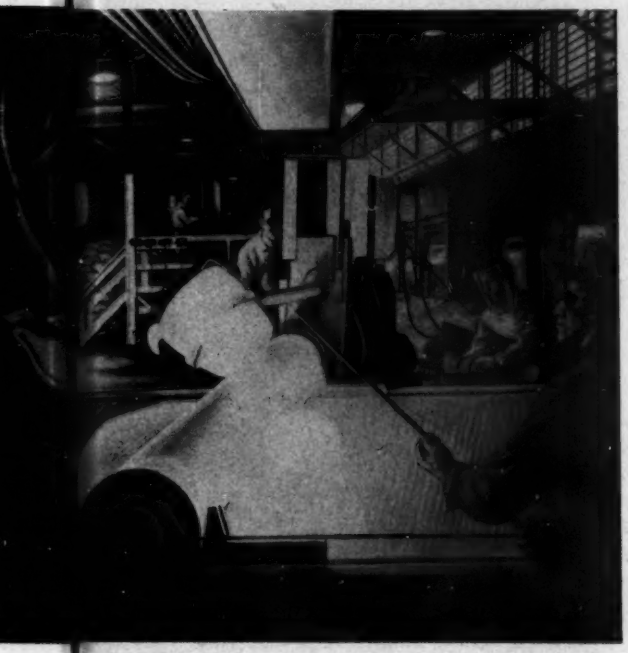


Fig. 4.

Fig. 5.

Fig. 6.

Fig. 3. Blowing Acid Containers. Lung capacity, physical prowess and, paradoxically, extreme delicacy are required in the large gallonage glass containers.

Fig. 4. Rolling of Optical Glass. Strictest control over the index of refraction, the primary requisite—a slight error would mean a valueless microscope objective.

Fig. 5. No machinery has been devised to take the place of the skill of the hand-blown in the forming of a condenser.

Fig. 6. Moulding a large optical lens.

GLASFLOSS—A SMALL MODERN FIBRE GLASS PLANT

By K. W. GASS, Executive Vice President
Amsler-Morton Division
Union Industries, Inc.

The Glasfloss Manufacturing Co. plant in Hicksville, L. I., New York, was designed and equipped for the special purpose of making glasses of the particular analyses, and in the form desired, for the manufacture of glass fibers.

Even though the quantity of glass required each day is not relatively large, the quality is of great importance, justifying the most careful attention to the details of its manufacture. Further, in the arrangement of the factory units, and in the selection of equipment, matters of convenience, efficiency, safety, and good working conditions were given serious consideration by the engineers, Amsler-Morton Division, Union Industries, Inc., of Pittsburgh, Pa. The factory buildings and foundations were designed by The Austin Company of Cleveland, Ohio.

The presence of a nearby air field affected considerably the general design of the factory. It limited the maximum height of all structures to about 34 feet above ground level. Under this limitation the furnace economy lost the advantage of a natural draft chimney, the furnace foundation, therefore, had to be made unusually deep, and the factory—particularly the batch plant—had to be spread out over more ground area than would normally be economical.

Storage capacity for the major raw materials, including crushed cullet, is in the form of four vertical cylindrical steel bins, two bins having vertical partitions, resting on an elevated elongated concrete slab base. An electric power driven traveling enclosed belt and bucket elevator with power shovel, which can be spotted at any bin, is used to transfer sand, limestone, soda ash, and feldspar in bulk from box cars on the parallel railroad siding to the bins.

At the end of the row of bins there is a mixing building, separate from, but joined to, the main furnace building by a gallery. This isolation of the batch preparation equipment is in line with modern glass plant practice.

In the mixing building there is also provided a hopper to receive cullet either from foreign sources or from the factory, together with equipment to crush it, remove magnetic iron, and elevate the crushed cullet to storage bins.

The proportioning—by weight—of the raw materials and crushed cullet, and the mixing of these materials into batch for the furnace, can all be performed by one man in one eight hour turn. This man utilizes a rubber tired roller bearing manually operated truck, carrying a hopper mounted on a dial scale for gathering and weighing the raw materials and crushed cullet through gates in the bottom slab of the storage bins. He weighs out the minor materials from their original containers by means of a small floor scale and adds these to the batch. The operator then pushes the loaded weighing truck over to an enclosed belt and bucket elevator into the boot of which he discharges its charge for transfer to the elevated mixer. When the mixer has been charged, an operating lever is pulled after which the mixer automatically performs its function and discharges the mixed batch into the lower section of its own dust-tight casing. The mixer is then ready for the next charge.

Pulling finished glass fibre down from spinning furnace.

The furnace tender has at his disposal a number of special mixed bach buckets carried on an overhead track by roller bearing trolleys. These buckets are moved along their track manually from the mixer through the gallery to the furnace. The tender fills the buckets from a gate in the bottom of the mixer casing. The number of buckets is sufficient to feed the furnace for sixteen hours so that all proportioning and mixing is done during the eight hour day turn.

An electric driven variable speed Amco batch charger delivers the mixed batch to the furnace—receiving it from each bucket in turn, the buckets remaining on the overhead track. This method of handling each mixer charge as a unit from the storage bins to the mixer and thence to the furnace, guards against inaccuracies in proportioning and segregation of the mixed batch.

The melting furnace is of the Amco continuous,

Mat of fibre glass being delivered to annealing oven preparatory to being cut into battery separator shapes.

end port reversing regenerative type arranged for both gas and oil fuels. Under normal conditions oil fuel is used, with gas from the available municipal supply as the stand-by fuel. The working end of the furnace as well as the melting end is rectangular in form and a walkway is provided all around the melting and working area roof for convenience in servicing the roof and tie rods. Another walkway gives access to the furnace burners. In fact, every practical convenience has been provided to facilitate the operation and serving of the furnace. The air and fuel valve reversing mehanisms are operated from the furnace working floor near the batch charger. Since the furnace stack can not extend above the building roof an electric motor driven induced draft fan is installed between the reversing valve and the stack, arranged with a by-pass. The fan is protected by an automatically operated cold air inlet which prevents the temperature of the gases entering the fan from rising above 700 deg. F.

Two pyrometers assist the operator in maintaining the desired temperatures. One of these is a four point instrument with platinum-rhodium thermocouples which records the temperatures of the melting area and working area of the furnace, the glass feeder and the day tank which will be mentioned later. The other pyrometer is a two-point instrument which records the temperatures at the tops of the checker settings in the furnace regenerators. This instrument is complete with necessary accessories, including a signal bell, arranged to ring when the temperatures reach the point at which the furnace operation should be reversed.

One of the most effective and useful furnace accessories is the automatic draft controller. This equipment opens and closes a damper in the waste gas duct between the reversing valve and the induced draft fan to maintain the pressure in the melting furnace at the desired point regardless of the furnace firing rate, the atmospheric pressure, or the atmospheric temperature.

Since no cullet is produced as a by-product of the principal manufacturing operation and since the raw batch charged to the furnace must contain some cullet, a forehearth is provided to drain molten glass at continuous but variable rates from the furnace into a quenching tank from which it is removed, de-watered, and delivered to cullet carts by means of a continuous bucket-type conveyor. These cullet carts are then moved to the mixing building where the cullet is dumped into the cullet receiving hopper for final delivery to storage bins.

Up to this point there have been described the equipment and facilities by means of which the desired molten glass may be produced. To shape the glass continuously into the small chip form required, a rather unusual but simple mechanism was developed by Amco engineers. The molten glass is delivered to the mechanism by means of a forehearth having two bottom orifices through which the glass flows by gravity under the control of two adjustable refractory needles. A cut-off also is provided to stop the flow of glass when the orifice nozzles need replacing. The mechanism consists of two rolls—one of which is fitted with teeth, and a wire mesh belt cooling conveyor arranged to discharge into transporting containers. The rolls are mounted on horizontal axes and are power driven. The two streams of glass pass between the rolls where they are flattened into ribbons and notched. On cooling, the notched ribbons break into the desired chips. These chips are transported to the spinning room where they are manufactured into the glass fibre from which the battery separators and other products are processed.

Among the auxiliary equipments there is a small oven for holding spare refractory forehearth parts under heat ready for immediate use.

Principally for experimental purposes a small capacity day tank-type of glass melting furnace has been installed in the main furnace building, where it can be readily serviced.

Inspecting and packing finished glass fibre battery separators.

GLYCERINE IN THE FABRICATION AND TREATMENT OF GLASS PRODUCTS

by GEORGIA LEFFINGWELL, Ph.D. and MILTON A. LESSER, B.Sc.

Because of its outstanding war record, glycerine has become a familiar substance to the general public. The industrial technologist, however, has for generations learned to appreciate its many valuable potentialities and uses. As in so many other fields of endeavor, the value of glycerine in the fabrication and treatment of glass products stems from a really unique combination of physical and chemical properties.[1, 2]

Glycerine is a clear, practically colorless, odorless viscous, heavy fluid that is fully miscible with water and alcohol, but not with most organic solvents and most oils. An excellent solvent for many substances, glycerine has sufficient "body" to suspend a number of insoluble materials. Perhaps the most oustanding characteristic of glycerine is its hygroscopicity. This ability to attract and retain essential moisture is intimately associated with glycerine's value as a plasticizer. Because of these qualities, glycerine finds extensive use where it is essential to maintain flexibility and suppleness and to prevent excessive drying and brittleness.

Chemically, glycerine is probably the most important of the polyhydric alcohols. With its three hydroxyl groups, glycerine ($C_3H_5(OH)_3$) is capable of reactions to form a number of industrially valuable derivatives. Of these, none are as important as the modern synthetic alkyd resins, which have a number of important uses in the treatment of glass products.[3]

The manufacture of laminated or shatter-resistant glass has long found glycerine a valuable plasticizer for the adhesives or sandwiching materials used in bonding glass sheets. Thus, glycerine has been used in conjunction with gelatin[4] or other[5] adhesives as well as with newer materials like polyvinyl alcohol.[6] The basic principle used in making safety glass was employed during the war as a protection against the dangers of splintered glass in bombed areas. The British used glycerine-plasticized adhesives to assure long life holding powers. This method[7] of applying strips of cloth, paper or transparent cellulose to glass windows met with the approval of American authorities.[8, 9] Its immediate need fortunately gone, this type of glass protection and the avoidance of glass injury may well be of value in areas where construction blasting is being done.

The familiar chemical reaction taking place when glycerine and litharge are mixed has been extensively employed in making extremely hard, resistant cements for bonding glass to itself or to other materials.[10] Useful as special putties and in the preparation of watertight glass tanks and such, these simple glycerine-litharge cements have been quite widely utilized in joining glass to metal, wood, ceramics and other substances. Noted for their resistance to heat, moisture, acids, bases and many organic liquids, these easily prepared mixtures are invaluable where strength, durability and quick-setting properties are desired.

Glycerine finds a number of valuable applications in methods and materials used in marking or decorating glass surfaces. Processes for fusing pigments onto glass surfaces, as well as chemical or mechanical methods for etching glass, call one or more properties of glycerine into active service. Pigment-containing inks for marking laboratory glassware and other objects frequently contain substantial proportions of glycerine as a suspending and viscosity-controlling agent.[11] Glycerine is also useful in processes whereby glass is decorated by spraying with enamel-oxide mixtures in suitable vehicles and subsequently fused by heat fusion. According to one report[12] on this method of decorating glassware, the addition of glycerine to alcohol-water vehicles insures smoother application of the mixtures.

In glass marking products depending upon the release of hydrofluoric acid as an etching agent,[13] glycerine often serves both as the carrier for the active ingredients and as a means of controlling or regulating the action of such components. In the so-called dry etching process, based on the use of ammonium fluoride and extensively employed for marking chemical glassware and such, glycerine serves as a plasticizer and hygroscopic agent in the gelatin pads and rolls required in the method.[14] Of interest in this connection is the use of hydrofluoric acid for cleaning heavily soiled glass surfaces. As described in two foreign patents,[15, 16] the compositions used for such purposes contain substantial proportions of glycerine.

Glycerine finds quite a number of uses in methods and materials based upon the use of abrasives. Indeed, glycerine has been recommended[13, 17] to effectively replace camphor-turpentine mixtures as a medium for suspending emery powder or other abrasives used for grinding and polishing glass. Glycerine has sufficient body and viscosity to carry the abrasive well. In addition, it is water-soluble, making it quite easy to clean a finished job or make close progress inspection. This same property forms the basis of glycerine's employment for removing scratches and such from glass. The abrasive, of the requisite fineness, is suspended in glycerine and applied on a suitable pad.

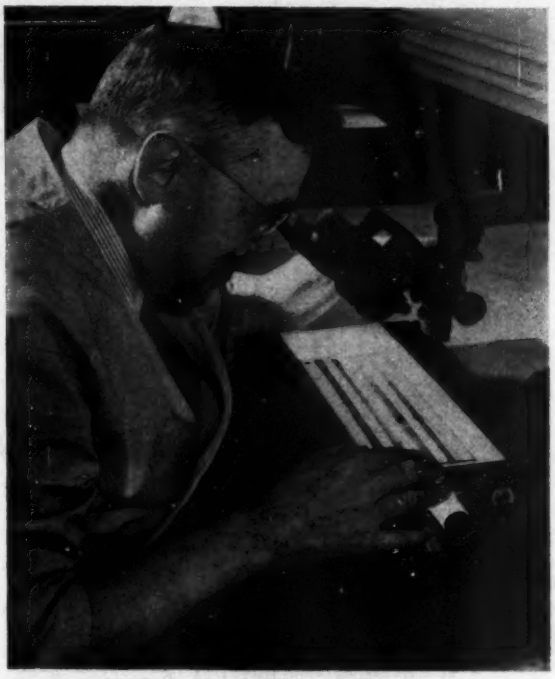
Where sand blasting is used to form patterns or designs on glass, glue or gelatin sheets made flexible with glycerine are used as stencils. The stencil sheet is applied to the object to be etched and the design cut into the flexible sheet. Noteworthy is the fact that the glue stencil is sufficiently strong and resilient to resist the high-speed abradant particles that are capable of etching the hard glass.[18]

Glycerine also contributes to the manufacture or efficiency of abrasive wheels, sheets and disks used in ornamenting, polishing, grinding or shaping of glass products. For example, in the manufacture of ceramic-bonded abrasive wheels containing diamond and sapphire particles as the grinding agents, glycerine is employed as a massing agent to prevent drying and crumbling prior to firing.[19] During firing the glycerine vola-

(*Continued on page* 482)

CAUSE OF GLASS SOLARIZATION

The reason why glass picks up an invisible "suntan" under the bombardment of ultraviolet radiation is non-technically described in a news release issued by the Westinghouse Electric Corporation of Pittsburgh, Pa.



Clue to Glass Suntan. Dr. Harvey C. Rentschler studies spectral lines of metallic elements in glass. By comparing relative intensities of the lines of metals photographed on the spectrogram after the materials are converted to gaseous vapors, detection of relative amounts of impurities is simplified.

It is stated by Dr. Harvey C. Rentschler, director of Westinghouse Lamp Research Laboratories at Bloomfield, New Jersey, that an alkali substance is the intruder or "uninvited guest" in glass, which causes the "glass suntan" known as solarization.

The solarizing effect, it appears, is a phenomenon similar to suntanning of the skin, where a desirable protective layer is built up to screen out the skin-reddening ultraviolet radiations of the sun. However, in the manufacture of special glasses which transmit bacteria-killing ultraviolet radiations produced by a lamp, solarization is undesirable since it cuts down the efficiency of the lamps.

By combining a recently-developed glass free of the alkali substance with new long-lived electrodes, Dr. Rentschler envisioned that Westinghouse "Sterilamps in the future may have three to four times the useful life of the best germicidal lamp currently available." The "Sterilamp" is a wand-like electronic tube which transmits from a mercury vapor source radiations which kill air-borne and surface bacteria, viruses and mold.

Knowledge gained in the solarization experiments, it is further stated, conceivably may be helpful eventually in the improvement of special window glass which transmits rays of the sun.

Solarization, which also affects these special window glasses, sets in because of impurities contained within the glass. For example, Dr. Rentschler states, the reason that ultraviolet rays of the sun cannot break through ordinary window glass is generally attributed to the presence of metallic oxides in the panes which block out these rays.

Radiations Alter Oxides

In the special glasses which transmit bactericidal radiations, however, the report concludes that after four months of experiments solarization occurs because of the transformation of the metallic oxides from one form to another when the ultraviolet "peppers" the inner layers of glass which form the tubular bactericidal lamp. In respect to this phase of the development, Dr. Rentschler adds: "Of microscopic thickness, the solarizing screen, which is made up of materials opaque to ultraviolet, has a strong effect on the efficiency of the lamps. The screening action develops rapidly, during the first 100 hours of the lamp's life, reducing radiation as much as 10 to 20 per cent. Thereafter, the radiation continues to diminish but at a lowered rate."

To find the answer to the solarization enigma, the

(*Continued on page* 488)

Closeup of Burning Glass. A burning sample of powdered glass is shown as it was ignited and flung into an arc between two electrodes.

INVENTIONS AND INVENTORS

A Summary of Patents of Interest to the Glass Industry Issued During August

Feeding and Forming

A double-mouth bottle, such as is used for holding blood plasma, has been made by a new method invented by Frank H. Wheaton, Jr., Millville, N. J. This is shown in patent No. 2,283,098.

It is well known that it is impossible to make a bottle by automatic machinery having a mouth opening at the top and at the bottom. Therefore, the new method proposes to make a bottle, by the present automatic methods, having a regular finish at the upper end and the same contour at the bottom end but with what corresponds to the mouth opening closed by a cap. This cap is then cut off and the inside of the opening is then straightened and enlarged if necessary so that a cork can be inserted on this end as well as the other end of the bottle.

Patent No. 2,382,028 is an invention by Samuelson and Zappia and is assigned to their own company, the S. & Z. Manufacturing Co., Inc. of Indianapolis.

This patent discloses a mechanism as applied to a Lynch machine, for carrying out the process of their earlier patent No. 3,363,999. This prior patent relates to a method of blowing glass ware in the finish mold, in which low pressure blowing air is admitted first and followed by high pressure cooling air.

The later patent discloses a valve mechanism which avoids the use of flexible hose connections to the blow head. As shown in Fig. 1, compressed air at high pressure is admitted through the pipe 26 in the central column of the machine and carried to a valve 19 on each of the blow heads.

In order to supply low pressure blowing air, a branch pipe leads to a reducing valve 40. The low pressure air is controlled by a valve 29 which admits it to the blow mold at the proper time. After the ware is blown, the valve 29 is closed and the valve 19 is opened to admit high pressure cooling air. At the same time, a star wheel 25 is turned to open a vent to allow the cooling air to circulate and to escape from the mold. This construction permits independent control of the blowing and cooling air to each mold.

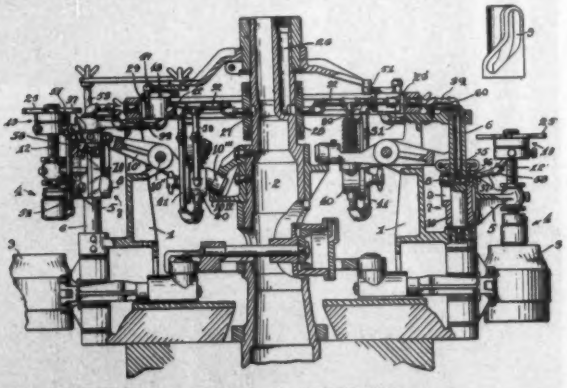


Fig. 1. Samuelson and Zappia, 2,382,028.

A patent No. 2,383,349 has been issued to Edwin E. Slick of Pittsburgh, Pa. This shows a twelve mold press, a vertical section of which is shown in Fig. 2. Glass is delivered from a stream feeder having a plug 57 by which the size of the stream can be regulated. It is stated that this is the first effective utilization of a continuous stream of glass in ware forming.

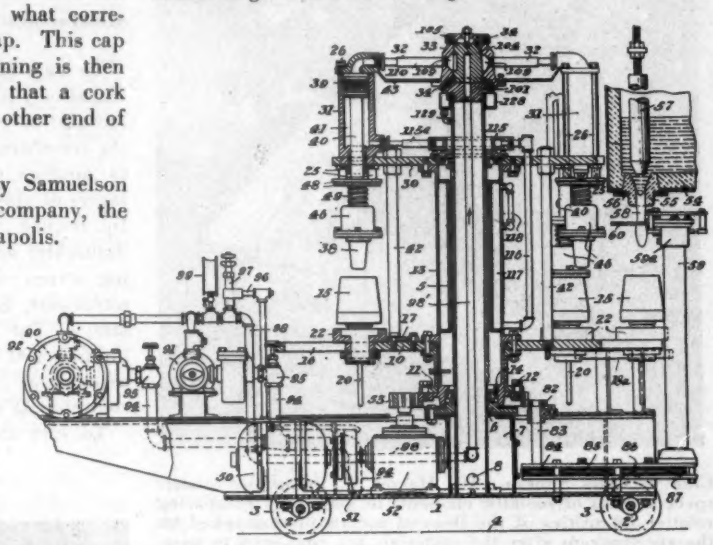


Fig. 2. Slick, 2,383,349.

A continuously rotating table 10 carries a series of molds 15 which are moved radially outward to a charging position by cam track 18a. Each mold has an individual plunger 38 and actuating mechanism therefor. The plungers are hydraulically operated by a pair of pumps, one of which is shown at 91. These pumps run continuously, providing a pressure which may be 400 lbs. Suitable control and safety mechanisms are provided to regulate the pressure. A distributing valve at the top of the central column directs fluid pressure to the plunger cylinders at the proper time. The shears 60 are actuated at high speed by a cam driven through a train of gears 82, 84, 85, 86 and 87. It is stated that this press is much simplified and highly efficient.

A machine particularly adapted for making lamp bulbs is shown in patent 2,382,052, assigned to Corning Glass Works by David E. Gray. This machine, Fig. 3, is of the single mold type, having a combined gathering, shearing, and blow head assembly which takes a charge of molten glass by suction from the surface of a pool. The charge in the suction cup is severed and puff-blown slightly and then placed in the finishing mold. One of the distinguishing features of the machine is that it is controlled by solenoids and operated by a plurality of motors.

This machine is divided into four separate operating units, which are a gathering head mechanism 13, a turning post mechanism 14, mold operating mechanism 15 and a timing mechanism 16. Three constant speed motors 33, 34 and 38 run continuously. The timing mechanism 16 is driven by a motor 543 through a variable speed transmission. The timer 16 controls various solenoids to initiate the various movements.

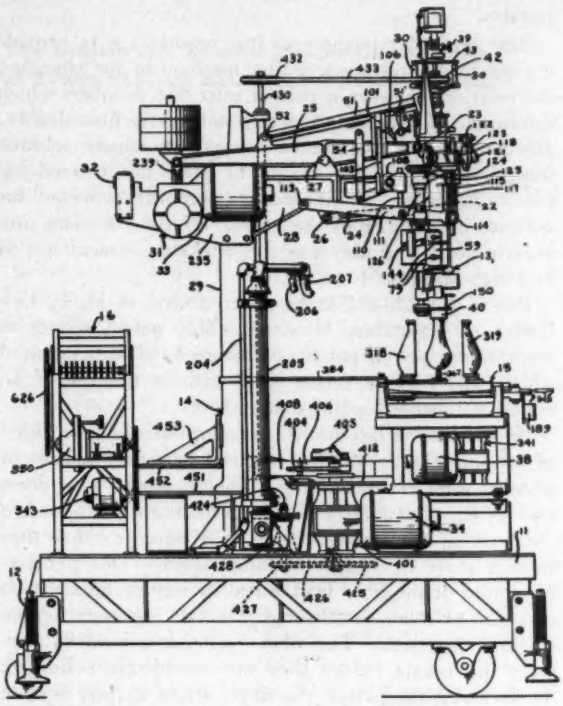


Fig. 3. Gray, 2,382,052.

A gathering cup 40 is lowered onto the surface of the molten glass, drawing up a charge by suction. After the cup is raised, a shear blade severs the connection to the pool of glass and chuck jaws close about the gathering cup to hold the charge in place. A plunger starts the formation of the blank which is shaped further by puffing air. After the blank has been fully formed, the molds 318 and 319 close about it and it is blown into final form.

This is rather a large patent, requiring 14 sheets of drawings and 10 pages of specification.

The Owens-Corning Fiberglas Corporation is the owner of patent No. 2,383,168 which is an invention by Games Slayter. This patent shows what might be called a tank for melting glass to be formed into fibers. This tank is in the form of a "U" placed on its side. A refractory member is lined with a conducting material such as platinum. Electrical connections are made to the upper and lower legs of the "U" shaped chamber and sufficient heat is developed from the plantinum lining to melt the glass which is preferably introduced in the form of marbles. The bottom of the lower leg of the "U" is provided with a series of small orifices through which the glass fibers are drawn.

Miscellaneous

Joseph P. Benoit, of Owens-Illinois Glass Company, has invented a conveyor running between the forming molds and the lehr, including a fire-polisher. This is shown in patent No. 2,381,798 which is assigned to Owens-Illinois Glass Company. A general idea of the device may be had from Fig. 4 which is a general diagram in plan view.

The bottles are delivered from the mold F, shown in the lower left hand corner of Fig. 4, to an upright shown in another patent to Benoit, No. 1,981,642. The upright places the bottles on a continuous conveyor 31, from which they are transferred to another continuous conveyor 40. The bottles are lying at the transfer point neck up, and each bottle is picked up by a receiving basket and inverted so that the bottle is then neck down. This conveyor 40, which is made up of a series of the receiving baskets, then carries the bottles to a fire-polisher station shown at the upper left in Fig. 4. While passing beneath the burner, the bottoms of the bottles are exposed to intensely hot flame so that the bottom is glazed, removing the usual sheer marks. After leaving the fire-polishing station, the bottles are carried by the conveyor 40 to a take-off conveyor 52. As the bottles are delivered to the conveyor 52, they are again inverted so that they stand neck up.

The conveyor 52 takes the bottles to a take-off device 55 (lower right in Fig. 4) where they are transferred to a conveyor 58, extending across the front of the lehr 59. The bottles are removed from the conveyor 58 and placed in the lehr by any desired stacking mechanism.

A burn-off machine is shown in patent No. 2,381,467, assigned to Owens-Illinois Glass Company by H. R. Schutz.

This burn-off machine is of the usual turret type. A series of individual heads are mounted on the revolving turret, one of these being shown in Fig. 5. Each head

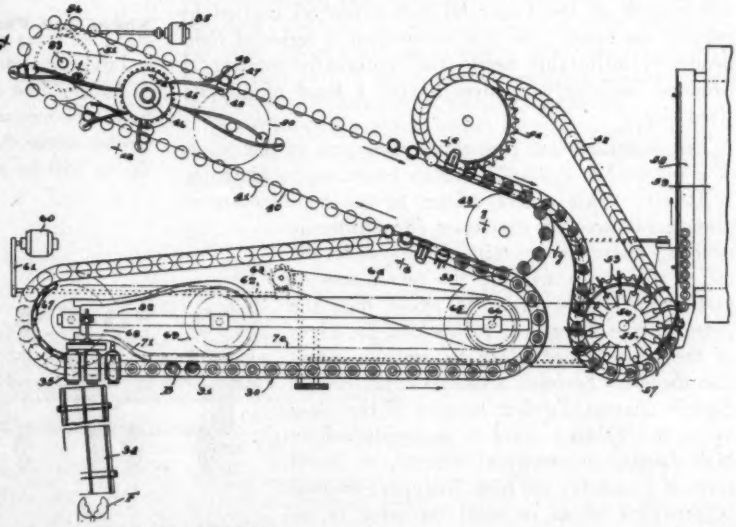


Fig. 4. Benoit, 2,381,798.

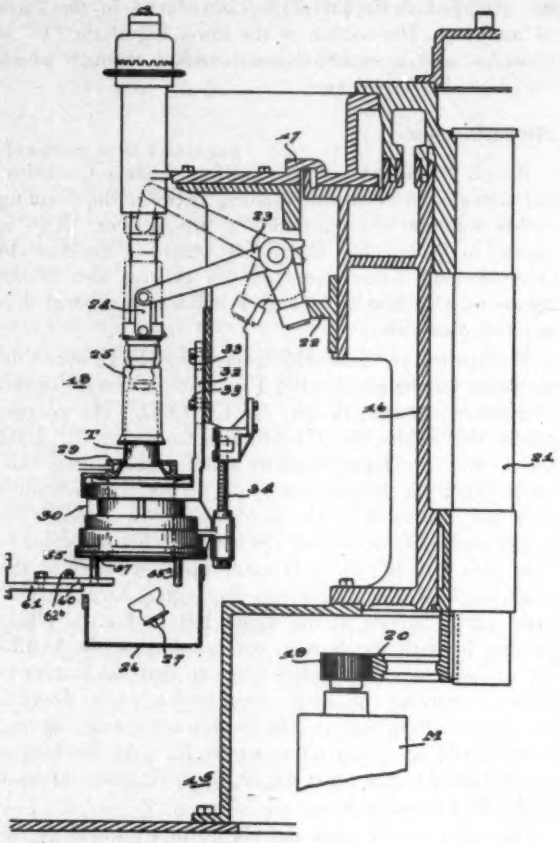


Fig. 5. Schutz, 2,381,467.

comprises a chuck 25 into which the newly made tumbler with its moil is inserted. The chuck is moved vertically at the proper time by a cam 22 which moves the moil into the burner 29 where it is burned off as usual. The burner may be adjusted vertically by the screw 34. In order to produce an unusually heavy bead or "safedge," the burners are moved up slightly after the moil has been burned off. This movement is produced by the engagement of the finger 60 and a pin 55 carried by each of the heads. By this mechanism, a series of independently adjustable heads are continually rotating to produce "safedge" tumblers having a bead of any desired size.

The Westinghouse Electric Corporation is the owner of a patent No. 2,383,113 for an invention by Hampton J. Dailey. This patent relates to the manufacture of glass enclosures or envelopes for electronic devices. There are certain objections to the use of flame for welding the two pieces of glass together. In order to avoid this, the patent uses a flame only to pre-heat the edges of the glass to be welded to such an extent that the glass becomes a partial conductor of electric current. Further heating of the glass up to the welding point is accomplished by high frequency electrical current. A novel form of brush for the high frequency current is provided so as to limit the area to be heated.

Glass Wool and Fiber

Patent No. 2,380,915 was issued to Ed Fletcher. This patent was assigned to Owens-Corning Fiberglas Corporation and it relates to a mechanism for attenuating glass fibers. Reference is made to a Slayter patent No. 2,230,272 for a more complete disclosure of the apparatus.

The particular purpose of this invention is to provide a convenient and quick acting mechanism for changing the relations between a pair of gear-like members which intermesh to a varying extent. A lever is provided for rapidly moving the gear members into closer relation immediately after the stream of glass has entered between the gears. A micrometer screw is provided for delicate positioning of the gears. This mechanism provides a quick and easy way of getting the stream started and then rapidly attenuated.

Patent No. 2,382,290 has been issued to M. E. Callander of Columbia, Missouri. This patent relates to the manufacture of patents or materials of mineral wool which will form a felted sheet without the use of an adhesive or other binding material.

Heretofore, it has been customary to use some kind of an adhesive or binding material to render masses of mineral wool self-sustaining. This invention provides a fiber of the character in which the fibers form a blanched structure and intermesh with each other so that they form a more or less solid felted sheet. This peculiar formation of the fiber is obtained by impinging a stream of steam or other gas through a nozzle and onto molten silicious material. The fibers are intercepted as they leave the nozzle before they are completely solidified. As shown in the patent, the fibers strike against flexible wire mesh belts arranged so that a pair of drive rollers are in fairly close proximity. The fibers shoot against the two belts and are then rolled together as they pass through the bite between the two rollers, coming out in the form of a felted bat or mat. Apparently the distance between the nozzle and the intercepter upon which the fibers impinge is quite critical. Under certain conditions and with certain raw materials, it was found that the best results were obtained at about eight feet.

Sheet and Plate Glass

Louis Boudin of Saint-Gobain, France, has been granted patent No. 2,382,379, disclosing an apparatus for making corrugated glass. The title to this patent is now vested in the Alien Property Custodian and licenses under it will be granted under the regular terms.

(*Continued on page* 480)

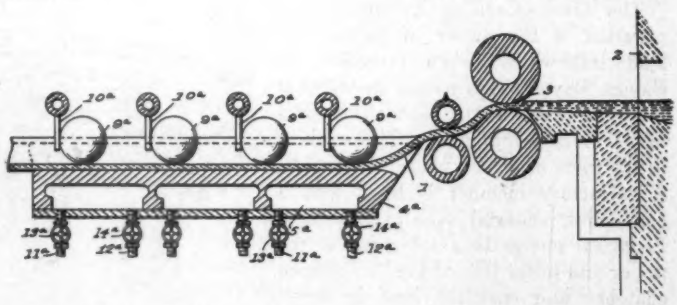


Fig. 6. Boudin, 2,382,379.

GJ Research Digest

Practical Interpretations of Glass Technology

The Elastic and Viscous Properties of Glass at Temperatures Below the Annealing Range

An experimental survey has been made by the elastic and viscous properties of a soda-lime-silica glass at temperatures in and well below the annealing range, using specimens cut from drawn sheet and a bending method for observing the development of the strain under an applied stress. This work is reported by G. O. Jones in the December, 1944, issue of *J. Soc. of Glass Technology*.

The results indicate that down to quite low temperatures the whole of the strain is made up of a purely viscous part, plus a completely reversible elastic part. The reversible elastic strain may again be divided into an instantaneous component and a delayed component which appears rapidly at first and then approaches asymptotically to a maximum value. It was often possible to continue the measurements until the whole of the delayed elastic strain had appeared, and a method was developed for the analysis of the strain-time curves, based on the observation that only that part of the delayed strain which had already appeared under load was later recovered on removal of the load, and on the assumption that the form of the decay function was similar for both deflection and recovery.

The total delayed elastic strain for a given applied stress is a function of the temperature, increasing from about 3 per cent of the instantaneous elastic strain at 200°C. to about 75 per cent at 444°C. (Tg, the transformation point for this glass was 534°C.) Above this temperature it became increasingly difficult to separate the instantaneous and delayed parts of the elastic strain, and this was suggested as the main reason for the many differences between the present results and the conclusions of N. W. Taylor and co-workers, which were based on work at these higher temperatures.

The true viscosity of thin glass at 350°C. was $10^{17.8}$ poises—appreciably lower than would be expected from an extrapolation of the curve obtained at higher temperatures, and supporting the conclusions of H. R. Lillie based on the measurement of viscosities in the range 10^{13}-10^{16} poises. This value of viscosity is substantially higher than measured values previously reported.

Strains in Glass Produced by Applied Color Labels

The fact that "applied color lettering" (A.C.L.) can weaken a bottle has been recognized from the beginning of the practice, and the fact that it normally does not but may even increase the strength slightly is also well known. Weakness arising from the "color" causes fractures with origins on the outer surface of the bottle wall and within the colored area. They are thus readily distinguished from those fractures which arise from weaknesses of the inside surface of the wall.

Ablard (*Journal of the American Ceramic Society*, July, 1945) has investigated this subject with commercial and experimental colors on pressure bottles of various manufacturers. A special thermal-shock test was used which tests the strength of the barrel of the bottle without producing large strains on the base. By correlation of such shock tests with the strain patterns observed in ring sections examined under the polarizing microscope and with thermal expansion data, it has been possible to set up a suitable procedure for insuring the proper "fit" of a ceramic color to a glass. With minor exceptions, the problem is similar to those of applying enamels to metals, glazes to pottery, and in sealing metals to glass which have already been discussed in the literature.

By an analysis of the respective thermal-expansion curves for the glass and the ceramic colors, the author suggests the reason for the experimentally found fact that the ceramic color must be of slightly lower coefficient of expansion than the glass in order to minimize the strain between the color and the glass when the color has been fired on to the glass and the two cooled down to room temperature. The suggested reason is that the fluxes used in the manufacture of ceramic colors are of necessity softer than the glass and, therefore, their annealing range is below that of the glass. From the shapes of the respective total expansion curves, it is shown that, when the color passes through its lower critical annealing temperature, its curve falls below that of the glass. If the coefficient of expansion for the color is less than that of the glass, the lower rate of contraction of the color balances out this initial high contraction so that at room temperature no residual strain is left.

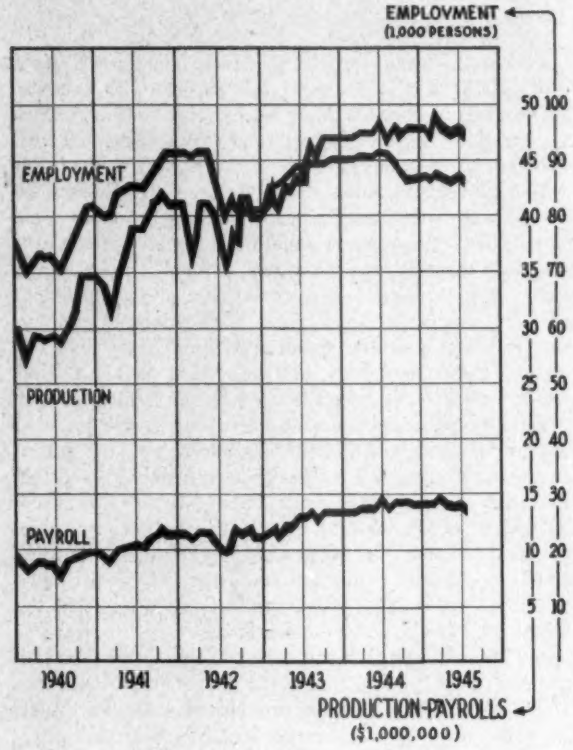
A brief discussion of the interface between the glass and the ceramic color is also included, with particular reference to the case of a flux containing lithia. The small-diameter, highly mobile lithium ion migrates into the glass, creating an interface tension cord visible under the polarizing microscope. Present information shows that this is permissible, provided the other factors mentioned have been properly adjusted.

The following table indicates the relationship between coefficient of expansion, polariscopic strain and thermal-shock strength.

Composition	*Flux No. 1*	*Flux No. 2*	*Flux No. 3*	*Undecorated (Bottle) Glass*
PbO	50.0	51.3	50.9	
SiO_2	35.2	35.7	35.6	
B_2O_3	10.8	9.8	9.9	
Na_2O	3.2	3.2	3.3	
Coefficient of thermal expansion ($\times 10^7$)	69	73	77	87
Optical path difference (strain, mμ/in.)	+35	—9	—165	
Thermal shock strength				
(a) Initial breakage level	145	105	80	135
(b) 10% breakage level	165	107	86	145

CURRENT STATISTICAL POSITION OF GLASS

GI THE GLASS INDUSTRY'S INDEX



July activity in the glass industry, as shown by the Production Index, dropped to $46,000,000 for the month. June figures were shown to be $48,000,000 and July 1944 figures totalled $46,000,000 which is the same as reported for July of this year. Output for the seven months of 1945 was $332,000,000 which is $1,000,000 less than the $333,000,000 reported for the same period last year.

Employment and payrolls: Employment in the glass industry during the month of July reached a total of 86,300 persons. This is approximately 2 per cent less than the 88,400 reported for June, and 5 per cent less than the 91,300 reported for July 1944.

Payrolls for July were estimated to be $12,500,000—about 5 per cent less than for June. During the January-July 1945 period, glass manufacturers have paid out to employees the sum of $95,700,00.

Glass container production for August was reported at 9,296,362 gross. This figure is a little more than 7 per cent greater than that reported for July and approximately 6 per cent greater than for August 1944. Production for the first eight months of 1945 reached a total of 69,023,360 gross as compared to a total of 68,041,863 gross reported for the same period of 1944. This year's total indicates about a 1 per cent increase over the 1944 figure.

Shipments of glass containers during August totalled 9,519,576 gross, an increase of about 9 per cent above July and about 11 per cent above August 1944. Total shipments for the January-August 1945 period are reported to be 70,650,296 gross. The same period in 1944 totalled 65,781,944 gross, or 7 per cent less than for 1945.

Inventories on glass containers for August dropped 3 per cent from the July figure of 3,943,156 gross and totals 3,800,906 gross. This figure also represents a 25 per cent drop from that reported for August 1944.

Plate glass production for August, as reported by the Hughes Statistical Bureau, was 8,965,701 sq. ft. July production was reported at 8,480,895 sq. ft. which is about 5 per cent less than for August. August 1944 production was 9,745,751 sq. ft., approximately 8 per cent higher than for this year. Total plate glass production

(*Continued on page* 480)

GLASS CONTAINER PRODUCTION AND INVENTORY

(All Figures Are in Gross)

		Production August, 1945	*Stocks August, 1945*
Foods; Medical & Health Supplies; Chemicals, Household, Industrials; Toiletries & Cosmetics	Narrow Neck ...	3,295,517	1,826,187
	Wide Mouth ..	2,991,610	863,625
Dairy Products		299,514	181,014
Home Canning		343,490	143,939
Beverages, Returnable		538,028	341,843
Beverages, Non-returnable			
Beer, Returnable		453,146	97,510
Beer, Non-returnable		374,908	58,192
Liquors		739,019	207,946
Wines		179,689	66,545
Packers' Tumblers		81,441	14,105
Total		9,296,362	3,800,906

GLASS CONTAINER SHIPMENTS

(All Figures Are in Gross)

Narrow Neck Containers	*August, 1945*
Foods	1,063,637
Medical & Health Supplies	1,009,367
Chemical, Household, Industrials	628,132
Beverages, Returnable	581,840
Beverages, Non-returnable	
Beer, Returnable	418,853
Beer, Non-returnable	351,852
Liquors	717,535
Wines	178,495
Toiletries & Cosmetics	539,265
Sub-Total (Narrow Neck)	5,488,976
Wide Mouth Containers	
Foods	2,484,190
Dairy Products	329,815
Home Canning	402,240
Medical & Health Supplies	270,521
Chemical, Household, Industrials	108,686
Toiletries & Cosmetics	162,852
Packers' Tumblers	99,147
Sub-Total (Wide Mouth)	3,857,451
Total Domestic	9,346,427
Export Shipments	173,149
Total Shipments	9,519,576

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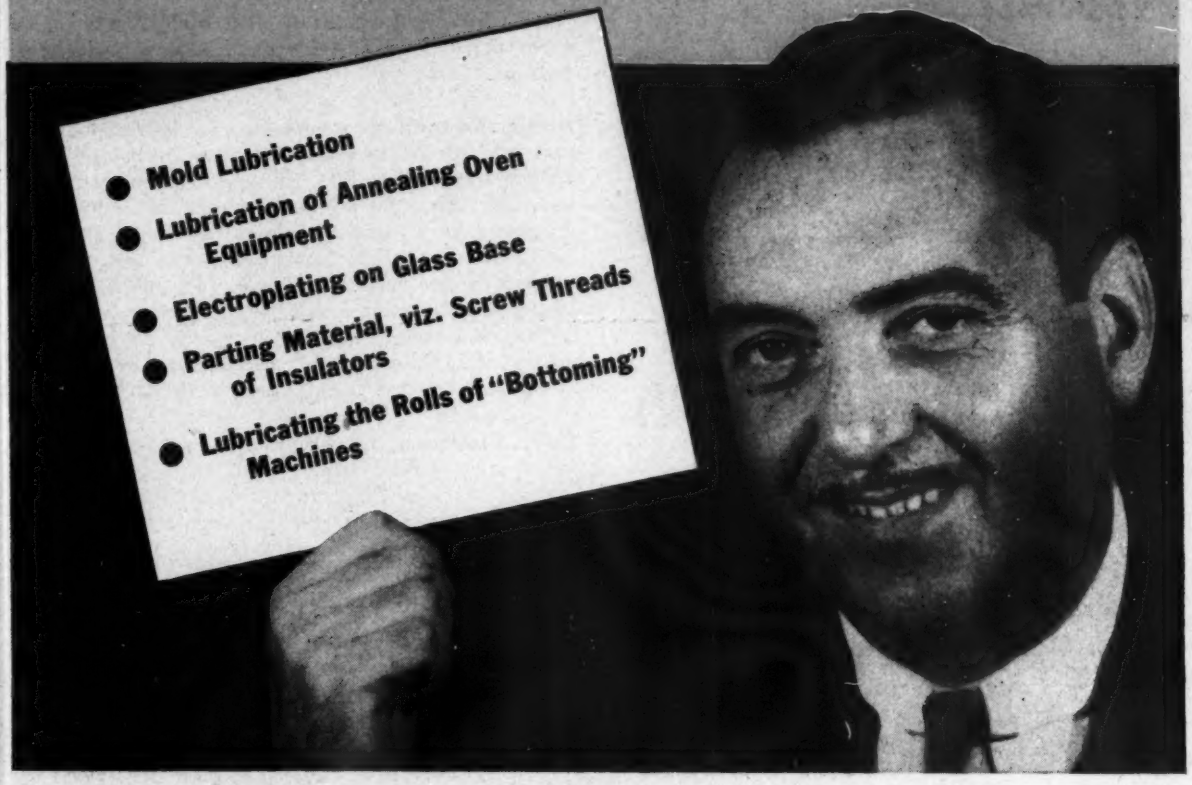
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CURRENT STATISTICAL POSITION OF GLASS . . .

(*Continued from page* 478)

for the first eight months of 1945 is 65,927,623 sq. ft. as compared to 69,155,395 sq. ft. for the corresponding period in 1944.

Automatic tumbler production for the month of August was reported at 5,433,843 dozens, as compared to 4,906,774 dozens for July—an increase of about 11 per cent. The August figure also represents an approximate decrease from the 6,650,927 dozens reported for August 1944. Shipments for August were 5,451,780 dozens, which is about 4 per cent higher than for July and about 14 per cent lower than the 6,344,650 dozens shipped in August 1944. Finished stocks on hand at the end of August were 4,080,739 dozens which represents an approximate 27 per cent decrease from August 1944.

Table, kitchen and household glassware: Manufacturers' sales of machine-made table, kitchen and household glassware for August were 3,189,780 dozens—a 46 per cent increase above the July figure of 2,191,261 dozens. August 1944's report showed 3,274,789 dozens sold which is about 2 per cent more than for this year. The first eight months of 1945 totalled 33,466,130 dozens in sales.

INVENTIONS AND INVENTORS . . .

(*Continued from page* 476)

Fig. 6 shows a flat sheet of glass issuing between the rolls of a rolling mill 3 and passing over the longitudinally corrugated shaping member 4a. The particular novelty of the invention resides in a series of balls 9a. These balls are of such size that they complement the corrugations in the forming table and hold the hot glass firmly against the forming table until it has set. The balls are held from traveling with the glass by a series of pins 10a. The use of balls instead of a fixed upper shaping member prevents the drag on the glass which would occur in passing between two fixed surfaces.

An apparatus for making sheet glass by the use of supersonic vibrations is shown in patent No. 2,382,187. granted to Alfred Vang of Summit, N. J. He assigned one-half interest to Stevenson, Jordan and Harrison, Inc., of New York.

This patent provides a plate on which a charge of molten glass is poured and means are provided for applying supersonic vibrations to the bottom of the plate. These vibrations are said to orient the molecules of glass and to provide a certain amount of stirring or mixing, and an electrical oscillator vibrates the plate through the agency of a pair of coils.

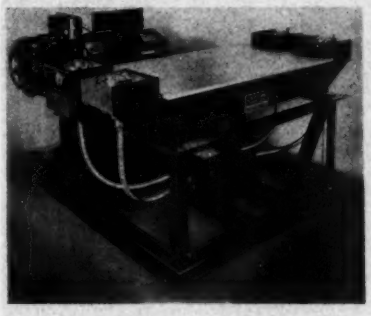
• R. L. "Mike" Cain has been made Assistant Sales Manager according to a recent announcement from Pennsylvania Salt Manufacturing Company.

NEW EQUIPMENT AND SUPPLIES

NEW VIBRATION TEST EQUIPMENT

The L. A. B. Corporation, Summit, New Jersey, has developed a reaction type vibration test table used to shake out faults in assemblies and components.

The large table top is supported by four vertical rods acting as flexing columns to permit free table vibration

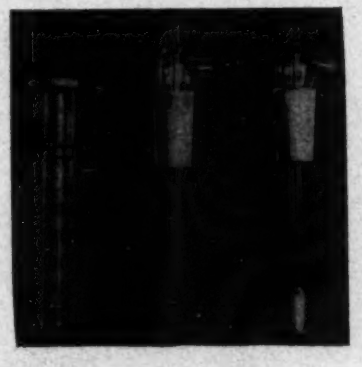


in the two horizontal directions. Four sets of rotating eccentric weights induce rectilinear and pure harmonic vibrations. These weights, mounted on vertical shafts, are driven by a variable speed drive through a synchronizing gear box and flexible shafts.

The amplitude (⅛" maximum excursion at 100 lbs. table load) and the direction of vibration (horizontal, crosswise or lengthwise) are adjustable when machine is not running. Increase in load over 100 lbs. automatically reduces the amplitude.

ALL-GLASS SAMPLING UNITS NOW AVAILABLE

The Mine Safety Appliances Company, Pittsburgh, Pa., has announced the development of new all-glass sampling units for use with the M.S.A. Midget Impinger. The Midget Impinger



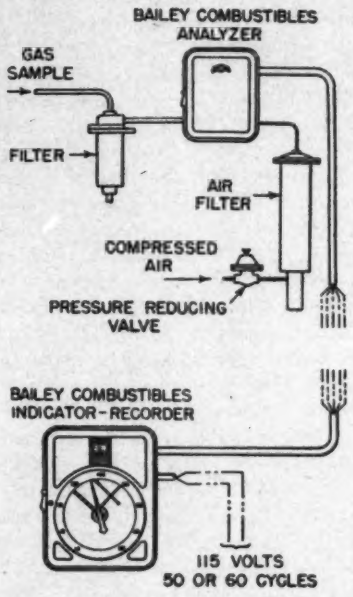
is a small, light, compact instrument which provides convenient portability with easy hand operation in surveying dust hazards.

The new units, making possible the sampling of a wide variety of dusts, gases and vapors, consists of a flask, nozzle with a standard taper ground-glass stopper, and a fritted glass bubbler.

The all-glass construction permits easy and thorough cleansing and prevents contamination or discoloration of the sample undergoing the test.

COMBUSTIBLES RECORDER-CONTROLLER

A new automatic analyzer and recorder for indicating, recording and controlling the combustibles content of a gaseous mixture has been developed by the Bailey Meter Company of Cleve-



land, Ohio. Application of this instrument has been succesful, it is stated, in its relation to precision control of furnace atmospheres and chemical processes, as well as combustibles measurements in the petroleum, metallurgical, automotive and chemical industries.

A continuous gas sample is mixed with compressed air and burned on a catalyst-filament which reaches a temperature proportional to the combustibles content. Since the filament resistance is a function of temperature, a simple resistance bridge connected to a null-balance electronic recorder completes the installation. It may be calibrated in per cent combustibles, mixture ratio or other desired terms.

Pneumatic control or electric alarm contacts may be provided on both one and two-pen recorders. A two-pen recorder utilizes separate analyzers so that the speed is not impaired by switching and the two records are independent of each other.

The analyzer and recorder provide a continuous graphic analysis almost instantly and are said to be responsive to changes of .05 per cent combustibles. Sustained accuracy is said to be within .25 per cent.

NEW WELDING ELECTRODES

The Metal and Thermit Corporation, 120 Broadway, New York, New York, has recently made available three new Murex welding electrodes to be known as Type U, Type MA and Type 347.

Type U is a mild steel electrode for general purpose welding which meets AWS requirements for Grade E 6013. Type U is primarily a single-pass fillet electrode which may be used in any position with alternating current or direct current on either polarity.

Type MA is designed for all-position welding of carbon molybdenum and other high strength steels where alternating current is employed.

Type 347 is an electrode for welding 18-8, 19-9 and similar stainless steels where stabilization with columbium is required. It has a titania type coating and may be used with either alternating or direct current. Type 347 is primarily designed for butt welding in the flat position.

CATALOGUES RECEIVED

Dow Corning Corporation, Midland, Michigan, has made available a catalog listing all of the Dow Corning silicone products now available, together with many charts and graphs demonstrating the properties of the organo-silicon-oxide polymers.

Dow Corning silicones are produced in many forms including fluids, greases and compounds, resins and varnishes, and silastic. These main classes of silicone products and many special formulations among each of them are described in the new booklet, together with industrial uses for these heat stable, waterproof materials.

Pennsylvania Salt Manufacturing Co., Philadelphia, Pa., has recently issued a booklet, entitled "Salt of the Earth," covering their mechanical exhibit at the Franklin Institute in Philadelphia.

The booklet illustrates sections of the exhibit's simulated working model of a chlorine-alkali plant in operation, as well as a photographic reproduction of the exhibit as it appears in the Institute.

Fonda Gage Company, Stamford, Conn., has released a bulletin, Data Sheet TC-1, giving a description of the Fonda Tungsten-Carbide Gage Blocks.

The bulletin gives a brief review of the development of these new gage blocks and features in a list of specifications and characteristics items on wear resistance, finish, stability, wringability, cost, corrosion resistance and Bureau of Standards requirements.

(*Continued from page* 472)

tilizes away without leaving any carbonaceous residue. Its plasticizing effects are called into use in making flexible, abrasive sheets, bands and disks. In such applications, glycerine may be used to plasticize the abrasive-bonding agents, the backing or support materials, or both.[20-21-22-23]

On occasion glycerine has been employed in making decorative, colored mirrors. In his discussion of such products, Schweig[24] mentioned the use of glycerine in the production of gold mirrors and gave two glycerine-utilizing formulas for making copper mirrors, valued for their soft, pink colors. In a patented procedure,[25] glycerine is specified in the production of complex copper compounds used in making copper mirrors.

Glycerine finds very extensive use in the formulation of a large variety of glass cleaning and polishing materials. Employed as a solvent and hygroscopic agent (in the case of polishing pastes), glycerine serves to "wet" the adherent dirt and facilitates polishing. Quite a number of such glass cleansers have been described in both the technical and patent literature.[1-2-26-27-28] Such products need not be complex to be efficient. Indeed an effective cleaning and polishing liquid for glass surfaces may be made by adding 10 per cent of glycerine to a mixture of equal parts of alcohol and water.[29]

In many glass polishing products glycerine serves a dual function. Not only does it facilitate cleansing and polishing, but the film of glycerine left on the glass surface acts as an effective means for preventing clouding, fogging or misting. Products embodying this double action can be made from simple combinations based essentially on glycerine and soap.[30]

Glycerine has long been a premier agent for preventing misting, fogging, frost formation and related obscuring effects on glass surfaces whether they be windows, windshields, goggles or spectacle lenses. Its value in this connection has been verified by work done at the National Bureau of Standards.[31] Used in the production of anti-dimming solutions, pastes, pencils or sticks, and suitably impregnated cloths, the patent literature also offers a number of anti-dim compositions as well as products to prevent moisture accumulation or condensation on glass surfaces.[32-38] One interesting composition is designed as a coating for glass; the coat exuding glycerine to prevent ice formation.[39]

Readily removed masking compositions, made with glycerine, are advantageously employed to protect glass surfaces during painting or the like. A few years ago, for example, the use of a mixture of glycerine and whiting was advocated[40] as a coating for windows prior to the spray-painting of railroad cars. Although the initial cost of this combination was higher than that of compounds previously used, the saving in window breakage alone more than compensated for the difference.

The importance of glycerine in the synthesis of alkyd resins is indicated by the fact that more glycerine now goes into the production of these materials than into any other field of glycerine utility.[41] Highly versatile products with many uses in industry,[42-43] alkyds have reached the stage where they are the resins most widely utilized in the formation of protective and decorative coatings.[44] Made by the interaction between glycerine and a polybasic acid (usually phthalic anhydride), these resins are readily modified by various methods to meet many requisites, including a number of applications in glass fabrication and treatment.

It is of historical interest that the first suggestion for the practical use of these resins, made by Watson Smith[45] in 1901, was that they be used as cements for glass and ceramics. It was not for some time, however, that this suggestion was applied to the lamination of glass. In 1929, two foreign patents[46-47] were granted describing the use of glyceryl phthalate alkyd resins as bonding agents for uniting glass sheets. Others began to take advantage of the alkyd's moisture resistance and bonding properties.[48-49] Ways to overcome any tendency to brittleness by the use of suitable modifying agents were also developed.[50-51]

As cellulosic materials began to find increasing use as sandwiching materials for making laminated, "safety" glass, the alkyd resins were called into service to bond the cellulose plastic sheets to the glass surfaces.[52-53-54] Not only did the alkyd resins prove to be good adhesives, but they also served to plasticize the tough, reinforcing cellulose derivatives.

Other special adhesives for glass have employed alkyd resins to good advantage.[55] Also noteworthy is the rather extensive use of alkyd resins for making abrasive materials. Employed to bond the cutting and grinding particles to suitable supports,[56-60] alkyds have also been used to make such supports, the resin being used in sheet form in one patented instance.[61]

Since alkyd resins find their greatest uses in the formulation of protective finishes, it is not surprising to find these synthetics employed in making special permanent or temporary coatings for glass surfaces.[62-63] An example of the former is given in a patent[64] describing a process for making metal-coated reflectors. In this case, a layer of silver on the glass is first coated with copper and then with an overlaying protective film made chiefly of a glyceryl phthalate alkyd resin containing a metallic pigment like aluminum powder.

According to a Canadian patent,[65] a temporary coating for highly polished surfaces like glass may be made as a varnish, an alkyd resin begin specified as a suitable material for making the varnish. Also mentioned was the use of ester gum, made by the chemical interaction of glycerine and rosin. The coating made in this way may be loosened from the polished surface with benzene or other solvent and then washed free with water.

Before concluding, mention should be made of a procedure, based on the use of an alkyd resin, for making distinctive identifying marks on lenses, mirrors and like finished glass surfaces. In this instance,[66] the objects are marked with a glyceryl phthalate paint and then heated until the paint has been fixed to the desired extent.

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(*Continued on page* 484)

NO HEADACHES IN THIS PERFORMANCE!

THE photograph below shows a portion of a Maryland Glass Co. tank which produced 61,415 tons of Bromo-Seltzer blue glass in 934 operating days. The furnace was a Corhart* Balanced Unit. The rest of the figures are as follows:

OPERATING DAYS	934
IDLE DAYS	131
TOTAL DAYS	1,065
SQ. FT. MELTING AREA	392
TOTAL TONS GLASS PRODUCED	61,415
TONS PER SQ. FT. PER LIFE	157
SQ. FT. PER TON PER OPERATING DAY	5.96

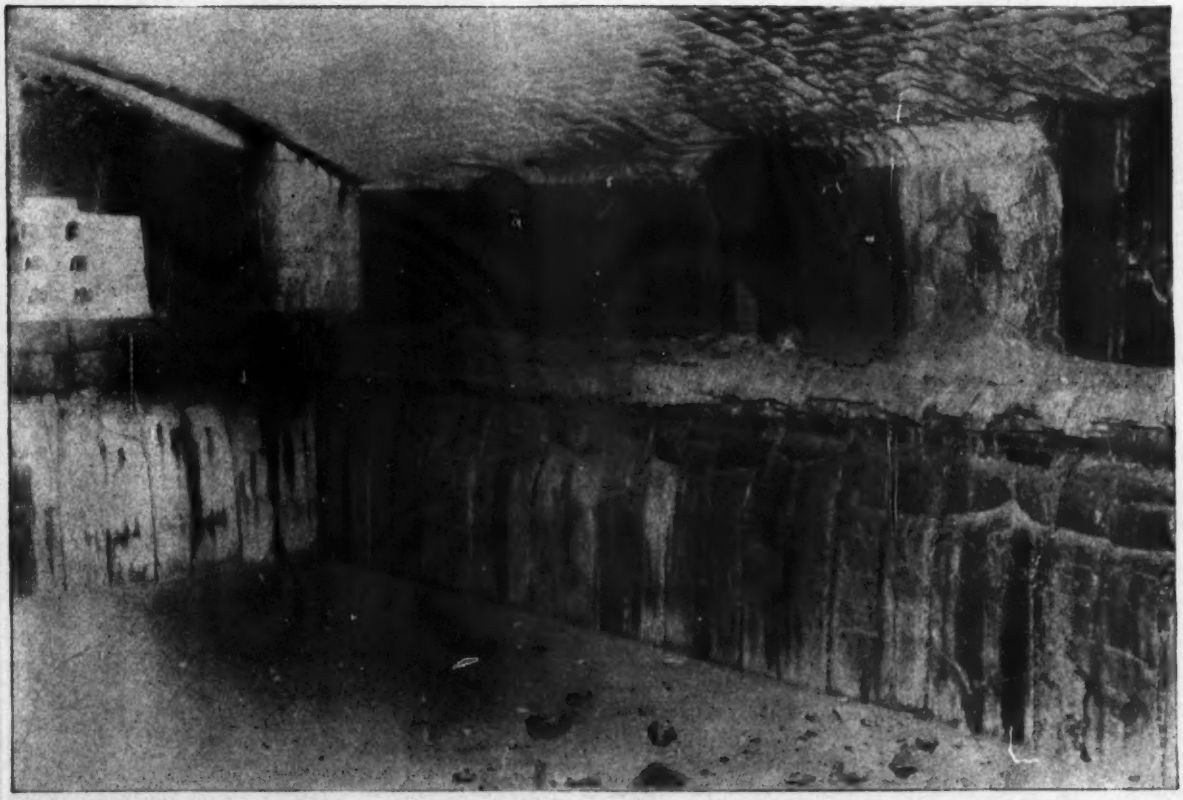
Loads such as these require refractory materials that can really "take it" both below and above the glass line. Corhart is proud to have played a part in such an outstanding performance.

Corhart Refractories Company, *Incorporated,* Sixteenth and Lee Streets, Louisville 10, Kentucky.

*Not a product, but a registered trade-mark.

QUALITY ENDURANCE

CORHART ELECTROCAST REFRACTORIES



Automatic
COMBUSTION Control FOR A GAS-FIRED GLASS FURNACE

HAYS
AUTOMATIC TANK
PRESSURE CONTROLLER

HAYS
AUTOMATIC GAS-AIR
RATIO CONTROLLER

FOR most efficient results two controls are used. See the installation sketch above showing instruments and connections. The Hay's Automatic Tank Pressure Controller is connected to the crown of the furnace and actuates the stack damper. This control operates with a few thousandths of an inch of water pressure, so that there is always an accurate relationship between the pressure in the tank and the stack draft, which is controlled within very narrow limits.

A Hays Automatic Fuel Gas-Air Ratio Controller is also used which, by measuring the intake flow of gas and air, maintains at all times a definite air-gas ratio, and a high percent of CO_2 in the stack or exit gases.

Each unit performing its own function works with the other to produce the best furnace temperature and pressure, and the most efficient atmosphere.

For oil, the same system applies, but the instruments are a little different.

For Full Information Send for Bulletin 43-552

The HAYS CORPORATION
COMBUSTION INSTRUMENTS AND CONTROL
MICHIGAN CITY, INDIANA, U.S.A.

ROGER J. HOUZE DIES

Roger J. Houze, President and General Manager of the L. J. Houze Convex Glass Company, died last month.

Mr. Houze was managing head of the organization and has contributed much to the advancement of the optical, industrial and lighting glassware industry.

MATHIESON ADDS NEW PLANT AT NIAGARA FALLS

The Mathieson Alkali Works is constructing a new plant which is expected to double the output of sodium chlorite. The addition is being made to the company's present facilities in Niagara Falls, New York.

Sodium chlorite was made commercially available by Mathieson in 1940 and has recently been found to be an effective element in a process for the removal of tastes and odors from public water supplies. Because of the inadequate supply of the chemical available, the company feels the plant is badly needed to bring the production capacity up to demand and to further experimentation.

GLYCERINE IN THE FABRICATION AND TREATMENT OF GLASS PRODUCTS . . .

(*Continued from page* 482)

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PUBLIC RELATIONS DIRECTOR APPOINTED AT L-O-F

Libbey-Owens-Ford Glass Company has announced the appointment of North A. Wright to the post of Public Relations Director.

In an effort to broaden the scope of the glass company's peacetime activities, Mr. Wright will correlate the programs of the advertising, publicity, sales promotion and design departments. These departments are headed by Franklyn Hawkins, Earl Aiken, C. Dean Lowry and H. Creston Doner, respectively.

Associated with Libbey-Owens-Ford since 1933, Mr. Wright has been active in the sales and advertising work done by the company, and is a Director in the Producers' Council.

RIEMAN IN NEW CAPACITY WITH BALL BROTHERS

G. Fred Rieman has been appointed Director of the Fruit Jar and Domestic Products Division of Ball Brothers Company. In his new capacity, Mr. Rieman will direct and coordinate production planning, research, merchandising and the postwar development of the company's various domestic products. Frank E. Burt, with his regular staff, will continue as Sales Manager of the division.

Mr. Rieman obtained a leave of absence from Ball Brothers in 1943 to serve as assistant director of the War Production Board, Containers Division.

Prior to his association with Ball Brothers in 1939, Mr. Rieman was vice president of the Anchor Hocking Glass Corporation.

ACS SCHEDULES ANNUAL MEETING FOR NEXT SPRING

The 48th Annual Meeting of the American Ceramic Society is being planned to take place at the Hotel Statler, Buffalo, New York, from April 28 through May 1, 1946.

It is expected that transportation difficulties will have eased up sufficiently to permit the meeting and the Society is proceeding with the necessary arrangements.

STERLING GLASS ADDS WAREHOUSE

The Sterling Glass Division of the Warfield Company has awarded a contract to the Carl Guepel Construction Company for the building of a large modern warehouse addition to its present facilities. The warehouse will contain about 25,000 sq. ft. of floor space which will relieve the manufacturing building.

A new batch storage plant is also being built with a silo capable of storing material for two weeks' production.

These two new additions to the Division's present buildings is an effort to gradually modernize the entire plant.

DR. HAMPTON CORRECTS FALSE REPORT ON "NON-ACTINIC" GLASS

CHANCE BROTHERS LIMITED
Glass Works, Smethwick
No. Birmingham

Editor,
THE GLASS INDUSTRY

Dear Sir,

I appreciate your letter of July 26th concerning the glass with insecticide properties, and I had already drafted a letter to you which really answers your present letter.

I have seen the paragraph on page 350 of the July 1945 issue of THE GLASS INDUSTRY, in which the discovery of a new glass to kill flies is attributed to me. This somewhat garbled account which got into the press needs revision, and I shall be glad if you will let me state precise facts.

This firm, Chance Brothers Limited, developed a "non-actinic" glass during the 1914/18 War to protect lighter-than-air observation ballons from the effect of the sun. Arising out of this, after that war, we developed a glass which was registered under the name "Calorex," and for which the only specific claims were that it absorbed almost the whole of the infra red radiation of the sun, while transmitting some 60 per cent of its light. It was, we believe, the first glass of this type, although since that date naturally other Manufacturers have made glasses of somewhat similar properties. These are facts that can be substantiated in any Physical Laboratory.

The glass has been sold for its heat absorbing properties in enormous quantities in all parts of the world and fulfills a precise and useful scientific purpose.

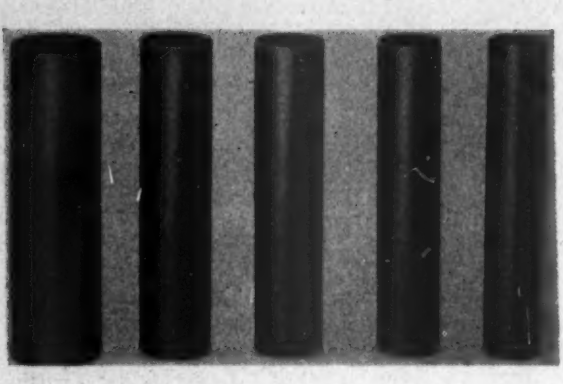
Somewhere about 1930 it was noticed that in an abattoir there was a decided reluctance on the part of flies to go under the glass and the statement was made (the letter is in our files) that "no fly could live in the hall, and any that entered were always found dead on the floor." Arising out of this surprising statement we had scientific experiments carried out in the Entomology Department of the Imperial College of Science and Technology in London, under the supervision of Professor J. W. Munro. Without giving details of all the experiments, which are available for anyone who is interested, it was found that flies showed a marked disinclination to remain on the windows, as compared with ordinary glass, and the counts made of the number of flies in the two sections of the experiment showed a marked advantage in the use of "Calorex" as a fly deterrent. There was no evidence that the flies were killed. Experiments were also carried out to show that this was not entirely due to the exclusion of heat rays, although this was the more evident effect, but that some part of the deterrent action was due to the colour. Professor Munro reached the conclusion that "both these effects give to 'Calorex' glass a definite value as a fly deterrent."

Those are the facts, and any more precise claim about death rays and so on has not been substantiated by scientific experiment.

Yours faithfully,

W. M. Hampton
Technical Director

GUNITE
ROUND BAR STOCK



In actual glasshouse use round bar stock of Gunite has delivered highest performance for sleeves, plungers and similar castings.

Patterns are available in eighteen diameter sizes ranging from 3/4″ to 5″, all bars are 14 inches long.

Gunite has proven to be of ideal hardness for glasshouse work. The metal can be machined with relative ease, yet retaining sufficient density to afford a brilliant polish.

There is a suitable Gunite Alloy for every type of glass making part. Miller plungers and guide rings, neck ring sticks and round bar stock.

•

GUNITE
FOUNDRIES CORPORATION
ROCKFORD ILLINOIS
Established 1854

THE FOREMAN'S PART IN VETERAN REHIRING . . .

(*Continued from page* 467)

making any statements which might be interpreted by workers as assurance that the latter will be "protected" in their jobs. The clear-cut right of the veteran to reclaim his job should be understood by all who stand to lose out by his return.

In some instances, it will be found possible to avoid displacing workers. Vacancies left by resignations and discharges for cause may sometimes be left unfilled, or may be handled by persons temporarily transferred from other jobs or departments. Spread over a period of months, the normal mortality may leave ample openings for the returning servicemen. But even this "painless" course involves skillful planning by the foreman and his boss.

5. *Reinducting the veteran:* The first day back on the job is a Red Letter Day for the former warrior. He has been looking forward to it for months, even years. At the same time, he probably has worried about it, too—wondering if he can still "make the grade," worrying how he will "fit in."

Here is where the foreman can do valiant service, both to the company and the individual veteran. If the latter is to work again under his direction, the foreman should welcome him like the Prodigal Son, and personally introduce him to his new fellow workers, because most of them may be strangers. If the veteran's former supervisor has been transferred to some other department, he can still help out by escorting the returnee to the job assigned him, and by presenting him to the new supervisor in charge.

Everything normally done for a new worker should be done for the returned veteran—*plus* all the trimmings of kindliness and consideration and remembrance that can be added.

6. *Weathering the readjustment period:* Much of the "problem child" copy that has been written about returning veterans was based on limited experience—largely with men who were discharged for medical reasons. Without idealizing the veterans who are now returning to civilian life, it is a good start to concede that the great majority of them are healthier, stronger, more amenable to discipline and better trained to resume civilian responsibilities than were their counterparts after World War I.

Of course it is hard to settle down to a machine or a truck after handling machine guns and tanks. There is boredom in a job, just as there was in the camp or the distant island base. There are hard-to-bear domestic responsibilities, just as there were hard-to-bear relationships in barracks or in close quarters afloat. And there may be a sprinkling of special cases for every plant to handle—but it is better to single them out for special treatment than to take the opposite extreme and regard all veterans as "queer."

The foreman who managed to get through the war with marginal labor—nursing this one, encouraging that one, being a father to the youngest and a son to the overage—will have little or no trouble with veterans.

Reemploying them is a human relations assignment. That's why supervisors are the logical men to see the job to completion.

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OHCO HAND SPRAY GUNS are made by the same skilled workmen and selected materials as OHCO automatic and continuous Spray Guns. The Hand Spray Guns are designed to fill the needs of all spray requirements in the Ceramic Field. Our engineering department in designing OHCO Spray Guns, specify only the best in material and workmanship. This is an added assurance of perfect performance and longer life in OHCO Spray Guns.

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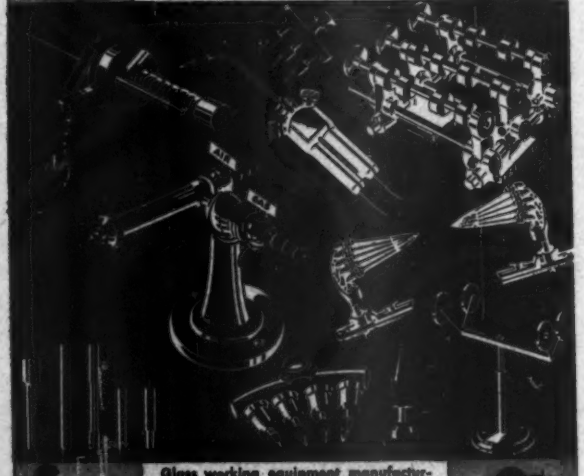

Glass working equipment manufacturers: glass ampules, vials, etc. Glass working lathes, bench fires and laboratory equipment of all types. Write for catalog
CHAS. EISLER
EISLER ENGINEERING CO.
742-50. 13th STREET

CAUSE OF GLASS SOLARIZATION

(*Continued from page* 473)

Takes Picture of Glass Metals. Removing the plate holder containing negative on which the spectrum of a burning sample of glass has been recorded.

Westinghouse scientist analyzed the various ultraviolet-transmitting materials spectroscopically.

He observed that alkali, particularly sodium, lines were absent in the spectra of only two of the materials tested. These two, the special glass developed by the Corning Glass Works, and quartz, transmit a maximum of ultraviolet in the bactericidal wave band with negligible solarization. Otherwise, all the glasses tested showed spectral lines indicating they contained very nearly the same amount of iron, magnesium, aluminum, manganese, calcium and titanium.

The intensity of useful radiation was higher when using the new glass as the transmitting agent than when quartz was used. This fact led to the conclusion that the ozone created by the short wave lengths which quartz transmits presumably absorbs some of the bactericidal radiation.

For his solarization tests, Dr. Rentschler placed powdered glass inside a carbon electrode. When an electric current was turned on, the vaporized material was flung into the arc stream between two electrodes so that its metal lines could be readily photographed on a spectrogram.

In tests of the new glass conducted as a corollary to his spectroscopic analysis, it was found that the glass not only has negligible solarization when exposed to ultraviolet but it also: (1) has virtually "ageless" ability to transmit almost perfectly ultraviolet radiations of wave lengths longer than 2,500 Angstrom units, the measuring rod for the bacteria-killing region of the spectrum, (2) transmits "very little" radiation below 2,000 Angstrom units, a factor which eliminates the production of excessive concentration of ozone by these short wave lengths.

HOWARD MacMILLIN JOINS ARTHUR LITTLE

Howard F. MacMillin has recently joined Arthur D. Little, Inc., industrial research organization.

In his new connection, Mr. MacMillin, formerly president and general manager of the Hydraulic Press Manufacturing Co., will direct the application to industry of developments in the mechanical engineering and applied physics field by the laboratories of Arthur D. Little, Inc. At present, this work will concern particularly conversion to peacetime uses of important equipment and processes developed during the war.

MACY'S-L-O-F EXHIBIT OPENS IN NEW YORK

Libbey-Owens-Ford Glass Company and Macy's department store have collaborated to present a department featuring all types of glass and mirror items for the home which have in the past been sold in many different sections of the store. The department will be known as the Macy's-Libbey-Owens-Ford House of Glass. For the first time, it will be possible to secure windows to furniture, mirrors to bathroom wall installations in one department.

The new section is believed to be the only one of its kind in the country in offering so many varied glass and mirror items to the consumer in one department. Specialists in the House of Glass will submit plans for the installation of these items and an installation service will also be available.

Featured in the House of Glass is a living room, dining room, powder and bathroom and kitchen all demonstrating the utility and beauty of glass in the home.

C. F. BOEHLER OF SENECA GLASS DIES AT AGE OF 83

Charles F. Boehler, president and treasurer of Seneca Glass Company, died recently at the age of 83. Mr. Boehler joined the Seneca Glass Company in 1899 and became president in 1941.

At the request of his brother, then president of the company, Mr. Boehler went to Morgantown, W. Va., and thus began an association with the company which lasted until his death.

CORNING ESTABLISHES PUBLIC RELATIONS DEPARTMENT

Corning Glass Works has announced the organization of a public relations department which will be responsible for the handling of news, institutional advertising, publicity, internal and external publications and other activities concerning the company's relations with the public.

The manager of this department will be Thomas F. Robertson. He has formerly been in charge of news and publications, and has been active in the editorial and advertising fields.

AVAILABLE
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Connections in the United States have been with nationally known concerns where his work has been entirely satisfactory. A European, he left Europe in 1939 because of the political situation and the anticipation of war. Since then he has resided and worked in Canada and the United States.

If you think this man can help you, for detailed particulars or a personal interview, address Box 28, c/o The Glass Industry, 55 West 42nd Street, New York 18, New York.

STATEMENT OF THE OWNERSHIP MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

THE GLASS INDUSTRY, published monthly at 55 West 42nd Street, New York 18, N. Y., for October 1, 1945, State of New York, County of New York, ss:

Before me, a Notary Public in and for the State and County aforesaid, personally appeared John T. Ogden, who, having been duly sworn according to law, deposes and says that he is the Publisher of THE GLASS INDUSTRY and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: John T. Ogden, publisher, 55 West 42nd Street, New York 18, N. Y. Cyril B. Delgado, editor, 55 West 42nd Street, New York 18, N. Y. Managing editor, none. Cyril B. Delgado, business manager, 55 West 42nd Street, New York 18, N. Y.

2. That the owners are: Ogden Publishing Company, 55 West 42nd Street, New York 18, N. Y. John T. Ogden, 55 West 42nd Street, New York 18, N. Y. Katherine Waller Ogden, 55 West 42nd Street, New York 18, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

(Signed)
JOHN T. OGDEN, *Publisher.*

Sworn to and subscribed before me this 18th day of September, 1945.

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AGA REESTABLISHES PUBLICITY SERVICE

The American Gas Association is reestablishing its publicity service which had been suspended during the war years. To head the renewed service, Arthur Q. Smith has been appointed Publicity Director of the Industrial and Commercial Gas Section.

Mr. Smith has an experienced background in advertising and publicity which he has cultivated from many years in various advertising, merchandising, publicity and public relations connections.

Prior to joining A.G.A., Mr. Smith was associated with the Commonwealth & Southern Corporation, Charles & Company and, more recently, with the National Association of Manufacturers.

THATCHER ELECTS VICE PRESIDENT OF PLANT OPERATIONS

The Thatcher Manufacturing Company Board of Directors has announced the election of Raymond W. Boeckman to the office of Vice President in charge of plant operations.

As Vice President, Mr. Boeckman will have charge of operations for all Thatcher factories in Elmira, Olean, New York, and Streator, Illinois. His headquarters will be at the company's home office in Elmira.

COLUMBIA CHEMICAL APPOINTS CHICAGO SALES REPRESENTATIVE

R. M. Simpson has recently been appointed sales representative for the Chicago area of the Pittsburgh Plate Glass Company, Columbia Chemical Division.

Mr. Simpson will have headquarters in the Tribune Tower Building in Chicago and will represent the company on the sale of alkalies, liquid chlorine, etc.

OPERATIONS TO START IN NEW GLASS PLANT

The construction of a new glass plant in Fairmount, Indiana, is nearing completion and operations are expected to start about October 1. The plant will operate under the name of Gem Glass Company and will be headed by A. J. Reek, President, and James E. Guard, Secretary-Treasurer.

The lifting by WPB of the ban on the use of natural gas has made possible the opening of the plant and a gas line to the plant is now being laid.

This is the first glass plant to operate in Fairmount after many years and it is expected that orders now on hand will insure steady operation.

CORNING GLASS ANNOUNCES TWO PROMOTIONS

Two promotions at Corning Glass Works have recently been announced. Walter E. Smith, manager of the company's pressware plant in Corning, has been appointed chief engineer for furnaces in the glass technology department, and Clifford M. Heller will replace Mr. Smith as plant manager at pressware.

Mr. Smith will assume his duties about the first of the year. In his new post he will supervise the design and construction of all the furnaces throughout Corning's nine plants and twelve subsidiary and affiliated companies. Mr. Heller has formerly served Corning in the capacity of plant machine shop manager, and will assume his new duties immediately.

DR. HICKS JOINS CORNING BRAZIL AFFILIATE

Dr. John F. G. Hicks of the Glass Technology Staff of Corning Glass Works, has left the United States to become technical and scientific consultant for Brazil's leading glass manufacturing company, Cia. Vidraria Santa Marina. This company is an affiliate of Corning Glass Works of South America.

Dr. Hicks joined the Research Laboratory of Corning in 1938 and was active in the development of new methods for the manufacture of optical glass until 1943. At this time he joined a group of scientists engaged in the development of the atomic bomb. He returned to his duties at Corning last February.

HOBBS GLASS ANNOUNCES SCHOLARSHIPS

A recent announcement made by the Hobbs Glass, Ltd., London, Ontario, has revealed plans for presenting scholarships in architecture to students of the University of Toronto, McGill University and the University of Montreal.

The scholarships will go into effect with the current university sessions and will be awarded to the students who best solve the architectural problem presented in which glass is an important item. A different design problem will be selected for each school of architecture.

Subject of the design problems will be selected each year by the university faculty in conjunction with Hobbs Glass, Ltd., and faculty members will be the judges. The scholarship awards will cover one year's tuition at the university where the scholarship is won.

TWO NEW APPOINTMENTS AT PITTSBURGH PLATE

In a recent announcement from the Pittsburgh Plate Glass Company, it was revealed that Gordon E. P. Wright and Paul A. Ketchum have been assigned assistant general managers of branch offices of the company.

Mr. Wright has been connected with the company since 1916, starting in the general office, and organized what are now the safety and insurance departments. He has since served as assistant superintendent of the Ford City 4 glass plant and in a supervisory capacity in the commercial department.

Mr. Ketchum, associated with Pittsburgh Plate since 1931, has been with the Kansas City and Louisville branches, after which he became assistant manager, then manager of the Columbus, Ohio, branch. Until his recent appointment, he has been manager of the Toledo branch.

AGA APPOINTS ASSISTANT SECRETARY

A newly created post, that of Assistant Secretary of the Industrial and Commercial Gas Section of the American Gas Association, has been assigned to Mahlon A. Combs. This new position has been made necessary by the increased scope of industrial and commercial gas problems and activities.

Mr. Combs has been associated with the gas industry over a period of twenty-five years and has been on the staffs of the Consolidated Gas Company, American Gas Products Corp., New Jersey Gas Association and, more recently, with the Research and Development Department of the American Type Founders, Inc.

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